

## Food Waste Management as a Business Entrepreneurship Tool in Fast Food Restaurants in Matrouh Governorate

إدارة الفاقد من الأغذية كأداة لريادة الأعمال في مطاعم الوجبات السريعة بمحافظة مطروح

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### Abstract

الملخص

The current study focused on the relationship between entrepreneurship and food waste management. Entrepreneurship in food waste management can be instrumental in environmental protection, decentralization, economic restructuring, and job creation. Also, entrepreneurs can not only invest in waste management sector but also infuse new ideas, technologies, and skills that can transform waste from being a liability into an asset. Therefore, this study aimed at examining the relation between food waste management and entrepreneurship in restaurant sector; in order to reduce food waste and achieve zero waste, especially in fast food restaurants in Matrouh Governorate. Moreover, the study examined the impact of reducing food waste through applying entrepreneurship practices. The population of the study included the fast-food restaurants in Matrouh Governorate which are 71 restaurants. The target population for this study only included the branches' managers. In addition, the total population was included due to the limited population. Questionnaires were used as a data collection tool. The results showed the significance correlation between entrepreneurship and food waste management. Accordingly, the correlations and regression results of this study agreed with only the question of social responsibility and other questions which were concerned with the relationship between profitability and innovation were not influenced significantly. The results demonstrated that entrepreneurship elements positively affected food waste management practices separately and jointly. Moreover, the results showed that food waste management practices were correlated with social responsibility because they improve the efficiency of the restaurants in terms of social and environmental concerns.

تركز الدراسة الحالية على العلاقة بين ريادة الأعمال وإدارة الفاقد من الغذاء. يمكن أن تكون ريادة الأعمال في إدارة الفاقد الغذائي مؤثرة في الحماية البيئية واللامركزية وإعادة الهيكلة الاقتصادية وخلق الوظائف. كما يمكن لريادي الأعمال ليس فقط الاستثمار في قطاع إدارة الفاقد من الغذاء ولكن أيضًا نقل الأفكار والتقنيات والمهارات الجديدة التي يمكن أن تحول الفاقد من كونه مسؤولية إلى أصل. لذلك، هدفت هذه الدراسة إلى دراسة العلاقة بين إدارة الفاقد من الغذاء وريادة الأعمال في قطاع المطاعم؛ من أجل الحد من هدر الغذاء والتخلص نهائيًا من الفاقد في المطاعم، خاصة في مطاعم الوجبات السريعة في محافظة مطروح. وعلاوة على ذلك، فقد درست الدراسة تأثير الحد من هدر الغذاء من خلال تطبيق ممارسات ريادة الأعمال. شملت عينة الدراسة جميع مطاعم الوجبات السريعة في محافظة مطروح، والتي بلغ عددها ٧١ مطعمًا. وكانت الفئة المستهدفة لهذه الدراسة تشمل فقط مديري الفروع. وعلاوة على ذلك، تم تضمين الفئة الكلية في الدراسة بسبب الحجم المحدود للعينة. تم استخدام الاستبيانات كأداة لجمع البيانات. وقد أظهرت النتائج وجود علاقة ذات دلالة إحصائية بين ريادة الأعمال وإدارة الفاقد من الغذاء. وعلى هذا الأساس، أظهرت نتائج الارتباطات والانحدارات ان هذه الدراسة تدعم تساؤل واحد فقط وهو المسؤولية الاجتماعية، ولم يتم دعم التساؤلات الأخرى مثل تلك التي تهتم بالربحية والابتكار وعلاقتها بممارسات إدارة الفاقد من الغذاء. وأظهرت النتائج أن عناصر ريادة الأعمال تؤثر بشكل إيجابي على ممارسات إدارة الفاقد من الغذاء بشكل منفصل ومشترك. وعلاوة على ذلك، أظهرت النتائج أن ممارسات إدارة الفاقد من الغذاء مرتبطة بالمسؤولية الاجتماعية لأنها تحسن كفاءة المطاعم.

**Keywords:** Food Waste Management; Entrepreneurship; Fast Food Restaurants.

**الكلمات الدالة:** ادارة الفاقد من الغذاء؛ ريادة الاعمال؛ مطاعم الوجبات السريعة.

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## 1. Introduction

Food waste is one of the world's most important problems that attract a great interest to governmental and non-governmental organizations, most commercial industries and various types of media (Gustavsson, Cederberg, Sonesson, Van Otterdijk and Meybeck., 2011). The prevention of food waste in the hospitality industry is one of the most important global problems of excessive interest. Moreover, one of the main challenges of the current food systems is waste generation. Inefficiencies in food systems can be perceived through the unsustainable use of natural resources and large amounts of food loss and waste (Messner, Johnson and Richards, 2021). Alarming data indicate that food waste is a severe problem for the economy, society and environment (United Nations Environment Programme, 2021). Today, food waste is a widespread problem in society and is occurring in many different standards. In homes, schools and restaurants, wasting food is a daily practice. So, it becomes an issue of relevance between consumers and society (Messner et al., 2021).

Moreover, the hospitality industry has also been interested in increasing consumer awareness about how food is consumed and recycled, as a consequence of growing environmental awareness among tourists, governments, and other bodies, the sustainability of resources, waste management, and the greening of hotels have resulted in waste becoming a critical issue for the industry. Waste disposal and its regulation are both important and complex (Ball & Taleb, 2011). This increase in awareness has shifted the focus of consumers towards a preference for effective environmental responsibility. Some consumers have shown their willingness to pay more for services that have a less environmental impact, waste is one of the most environmentally affected issues, for as much to the huge amount of used resources in presenting utilities (Wang, Dou and Jia, 2016). There are many studies which clarified the relationship between entrepreneurship and food waste management. Clearly, entrepreneurship is the process of launching, owning, and running a new business that begins at a small scale and may grow into a successful small, medium, or large company (Almeida, 2012).

Apparently, Entrepreneurship in food waste management can be instrumental in environmental protection, decentralization, economic restructuring, and job creation. Therefore, entrepreneurial opportunities in waste planning are available in the areas of waste collection, handling, sorting, storage, transport, and transformation (Almeida, 2012).

It is worth mentioning that the fast-food industry provides its customers with easily accessible and time-saving food products because of effective production technologies. Easy and fast-food products have become more popular and more vital, and therefore the amount of waste created in the fast-food industry has increased (Aarnio & Hämäläinen, 2008). In fast-food restaurants, the consumer does not participate in waste separation. Although organic containers of food waste are almost non-existent in fast-food restaurants, it is up to the restaurant's designated site and staff to separate the waste. The customer in the restaurant is not involved in getting rid of its garbage, and he doesn't know how waste is discarded (Maguire, 2016).

## 2. Literature Review and Questions Formulation

### 2.1 Food Waste Management

#### 2.1.1 The Concept of Food Waste

Apparently, opportunity and the need to reduce the food waste have never been greater. The reduction of food waste could have significant environmental, social and economic benefits (Epler Wood, 2017). In addition to increasing the food availability, this reduction can reduce poverty and pressure on ecosystems, climate and water. This is a crucial element for closing the food gap between today's available food and the required food (Grocery Manufacturers Association, 2012).

Specifically, in the food and beverage industry, any variety of foodstuff becomes wasted when not used by a customer or employee in restaurant service (Eriksson, Osowski, Malefors, Björkman and

Eriksson, 2017). Food waste consists of food and beverages for consumption, kitchen wastes, and corrupt or expired products. Food wastes fall into two categories: food waste before consumption and after consumption. Pre-consumer food waste includes over-production, manipulation, finishing, and waste disinfection (Baldwin & Shakman, 2012).

### ***2.1.2 Food Waste Management Practices***

Apparently, Hollins (2013), summarized the most critical practices related to food waste management. The first to be discussed is Menu Planning, as it is the key to reducing food wastage, driven by many different operational decisions. A wide range of menu items should be provided to satisfy consumers while reducing waste associated with less popular options. If mistakes are made, the unserved food may be wasted (Messner et al., 2021). Then you would follow up with Procurement of Food by purchasing foodstuff, components, and other supplies which have a major impact on waste generation in food service outlets (Mbow et al., 2019). However, while doing these things you have to keep track of Food Storage and Stock Management as poor quality of refrigeration and freezing equipment reduce the shelf-life of materials and increase the amount of waste (The Waste and Resources Action Programme "WRAP", 2013). Besides, inventory management also includes monitoring short-life materials, such as sandwiches, which can be discounted for sale (Nguyen, 2018). And naturally what would follow is Food Preparation. Hence, preparation methods, and procedures affect waste types and quantities. In traditional kitchens that rely on raw components to gain the benefits of freshness, more waste occurs during preparation (Mbow, Rosenzweig and Barioni, 2019). On the contrary, Modern kitchens replace raw ingredients with pre-prepared ingredients for waste disposal. This pattern has been widely criticized, as it leads to higher packaging costs, lower food quality, freshness, and higher costs and energy use in storage areas. So, the ports have to balance in two ways (Hollins, 2013). Another thing to be kept in mind is Portioning and Serving so by controlling the size of the plate, food service outlets can reduce the dissipation of the plate (WRAP, 2011).

Meanwhile, Monitoring Staff Behavior plays an important role in food wastage control. Staff behaviors can either reduce or contribute to food waste (Nguyen, 2018). Awareness of staff in all key areas of waste generation and related opportunities to reduce such waste will encourage them to assist in addressing it. Any new arrangements should be fully communicated to the staff. They help them understand any new procedures and the reasons for that. Also, food waste management requires all executive officers to be informed of the company's policy and legal responsibilities about food waste (Mbow et al., 2019). Moreover, action procedures should ensure that sufficient time and human power are allocated to do so (Scotland, 2013). And to be able to do that, we have to think about Training Staff according to Environmental Protection Agency (2015) and Almeida Oroski (2020). Mention steps that can be used for training the staff in the food service outlets, such as creating clear and consistent signs with images, and in multiple languages, if necessary; motivating staff with recognition, awards, or incentives; regularly monitoring and checking for contamination; and making food waste management a competency indicator for employee evaluations to incorporate reducing wasted food as a standard expectation.

But after all those considerations there is another thing to keep in mind which is Guest Behavior because the biggest problem of food waste is with guests, as many people may not feel responsible for the food they leave when they eat. Doggy bags/boxes are another way to help reduce plate waste (Hollins, 2013). This is the encouragement of consumers by outlet staff to take away uneaten portions in doggy bags or suitable containers to be eaten later, where appropriate (Mbow et al., 2019).

Also, to visualize how to best take action we have to consider Food Waste Management Practices "5Rs" The FAO classifies food waste reduction strategies according to the categories of the inverted 'food waste pyramid'. Reducing food waste can increase the efficiency of the food supply chain and achieve economic benefits, including lower business costs and lower consumer prices (Food and Agriculture Organization, 2013).

Instead, today, we're talking a lot about environmental conservation and sustainability from the many effects of wasting food. With these environmental conservation issues, R has come as guidelines for environmental sustainability. These 5Rs constitute the first letters of some words that specify actions to mitigate these effects (Ribeiro, Sobral, Peças and Henriques, 2018).



Food Waste Management Practices "5Rs"

## 2.2 Entrepreneurship

Since the beginning of the 90s of the past century, entrepreneurship has become the main era. The hospitality industry, government organizations, business companies, and society as a whole are concerned with entrepreneurship, and all of these institutions also emphasize their importance to the national economy (Ciccullo, Cagliano and Bartezzaghi, 2021). Attention to entrepreneurship has increased in recent years as a result of technological progress and globalization (Chang, 2011).

According to Egypt vision 2030, Egypt aspires to achieve knowledge-based economic growth, digital transformation, increased economic resilience and competitiveness, increased employment rates and decent employment opportunities, improved business environment and entrepreneurship culture, financial inclusion, and the inclusion of the environmental and social dimensions of economic development (Ministry of Planning and Economic Development, 2020).

Consequently, entrepreneurship is a very important form to achieve multiple goals, entrepreneurs are often the main building blocks of the economy (Moustafa & Refaat, 2016). They face risks to meet customer needs and expectations (Godbole, 2013). Also, the entrepreneurship means creating new technologies and digital technologies can be introduced at every stage of the food system (FAO, 2020).

### 2.2.1 Concept of Entrepreneurship

According to Godbole (2013), entrepreneurship is the process of launching, owning, and managing a new project that starts on a small scale and can grow into a small, medium, or large successful business. Also, according to Tenda (2011), entrepreneurship can be seen as the process of assembling human and nonhuman resources to create and build an independent enterprise. This process entails creativity, risk-taking, and innovation, among others, and is a way of thinking, reasoning, and acting that is opportunity driven, holistic in approach, and leadership balanced (Moustafa & Refaat, 2016).

### ***2.2.2 Importance of Entrepreneurship***

According to Muhammad, Mohamed, Nasir, Sharifuddin and Ali (2020), entrepreneurship can be viewed as a national asset, and entrepreneurs are the driving force behind that asset. It's a complex mechanism that can both increase wealth and generate value, resulting in increased happiness (Moustafa & Refaat, 2016). Also, entrepreneurship plays an important role in changing society, so it makes sense to cultivate, motivate, and remunerate this greatest asset to the greatest extent possible (Newbert, Gopalakrishnan and Kirchhoff, 2008). As entrepreneurship accelerates economic growth, entrepreneurs are critical in market economies because they can serve as the driving force behind the country's economic development. So, they promote new employment by developing new products and services, which lead to a faster rate of economic growth. As a result, the public policy that promotes and supports entrepreneurship should be prioritised for economic development (Meyer & Jongh, 2018). By introducing creativity to every area of companies, entrepreneurial projects maximize production by using the existing resources in the most successful ways (Diandra & Azmy, 2020).

Moreover, entrepreneurs create new markets by developing new and improved products, facilities, and technology. Thus, they help create new capital and contribute more to the national income. As entrepreneurship promotes innovation, entrepreneurs introduce innovations to the market through proper research and development activities, which open the door to new companies, industries, products, and technology (Moustafa & Refaat, 2016). Then, entrepreneurs can help solve issues that can't be solved by current products and technology (Brook & Bam, 2015). Another note to the same effect, a core component of entrepreneurial activity is innovation, which is a method of evolving, experimenting, adapting, and revolutionizing. Innovation's "creative destruction" phase results in technical advancements and increased jobs (Cane & Parra, 2020). Furthermore, innovation and creativity are the most important tools for the success of entrepreneurship (Mullick, Raassens and Haans, 2021).

Also, innovation is used to exploit market opportunities and overcome any threats. So, this innovation can be a new product, service, technology, production, or marketing strategy (Billimoria, 2017). Thus, entrepreneurship can change people's lives by creating new products and services or adding creativity to existing products and services (Muhammad et al., 2020). Another point to bear in mind while speaking about the importance of entrepreneurs is that entrepreneurship can promote social changes. It's apparent that entrepreneurs change or transform societal traditions or cultures, reducing reliance on outdated methods, processes, and innovations. Entrepreneurs, in essence, are the forerunners in introducing innovations and processes that, in turn, bring about societal changes (Örnek & Danyal, 2015). These improvements are linked to a healthier lifestyle, more charitable thinking, increased confidence, and more economical options. Social movements have a gradual effect on national and global changes. In this way, as a result, the significance of social entrepreneurship must be appreciated (Brook & Bam, 2015).

Moreover, entrepreneurs are so dreaming that some of their ideas can make a difference worldwide. It may create a new product that resolves a burning problem or that takes on exploring something that has not been figured out previously (Billimoria, 2017). Entrepreneurship promotes research and industrial development. Along with that, entrepreneurs support research and development in addition to coming up with new business concepts and thinking beyond the box (Muhammad et al., 2020). They nurture their innovations, transform them into a new shape, and transform them into profitable business ventures (Zahra, Wright and Abdelgawad, 2014). Therefore, entrepreneurs are a unique breed of people who are constantly on the lookout for new ideas and ways to build on existing ones. However, their influence reaches beyond their businesses and ventures: when an entrepreneur creates a new product, service, or concept, it is common for others to follow suit (and sometimes even further refine the ideas) (Brook & Bam, 2015).

It's worth mentioning that entrepreneurs are frequently associated with the development of new products and innovations and they often affect established companies (Meyer & Jongh, 2018). Encouraging and fostering entrepreneurship can benefit a country's economy and even existing companies. Hence, social entrepreneurship can increase the possibility of seeking innovative solutions to social problems faced by societies all over the world (Muhammad et al., 2020). Without entrepreneurs, there will be no job opportunities. Entrepreneurs take the risk of employing themselves.

Ultimately, their ambition to continue to grow their businesses creates new jobs. So, it's good to note that entrepreneurs create jobs (Meyer & Jongh, 2018). Entrepreneurs give to society consequently; they are making more money and thus, paying more taxes that help finance social services. Entrepreneurs are major donors to charities and non-profit organizations for several reasons. Some are seeking to invest their money in solutions to help communities (Ferreira, 2016). Entrepreneurship generates new wealth in economics and new ideas for products or services. Thus, entrepreneurs allow new markets and new wealth to grow in any economy (Ferreira, 2016).

### ***2.2.3 Business Entrepreneurship Tools***

Many entrepreneurs care about a huge issue that makes them build an empire to solve some of the most difficult problems (Schroder, Prockl and Constantiou, 2021). Also, the entrepreneurial spirit of initiative always makes them seek to put their mark on the world by solving a huge problem or helping to advance a society (Ferreira, 2016).

Also, entrepreneurs need to be willing to take risks and have the vision to turn new ideas into business opportunities and get profit. Successful entrepreneurs need to be willing to take risks and have the vision to turn new ideas into business opportunities and earn profits (Bonina, Koskinen and Eaton, 2021). The entrepreneur always seeks to create new opportunities to solve a problem facing the hospitality industry which is the reduction and disposal of waste and turning it into a profit-making business (Godbole, 2013). The large amount of waste generated requires a system of collection, storage, transport, and disposal. It requires knowledge of the waste, and how it is necessary to collect and dispose of it (Cane & Parra, 2020). Waste recycling, power generation, and employment opportunities from waste management have enormous potential. Managing successful waste requires citizens, local governments, and private entrepreneurs (Godbole, 2013).

Finally, startup companies have developed processes that include collecting food waste, composting it, using it to produce local products, and then selling products back to customers to dispose of waste (Hunt & Ortiz, 2017).

### ***2.2.4 Some Leading Food Loss and Waste Reduction Initiatives***

The most important initiatives to explore food loss and waste reduction are as follows:

- **Too Good To Go:** It is a non-profit organization committed to reducing food waste. They take food that would otherwise be thrown away by restaurants, cafes, and bakeries and sell it at a discount (Wallner, 2017).

Since its inception in 2016, Too Good to Go has saved over 1 million tonnes of CO<sub>2</sub> emissions by diverting over 565,807 meals from landfills (Haar & Zeinstra, 2019). Moreover, there are various advantages of using this software. The first is, of course, to reduce food waste, allowing businesses and restaurants to operate in a zero-waste manner. Aside from its environmental benefit, the app allows users to acquire things at extremely low costs and to find products they were previously unaware of. As a result, Too Good To Go enables customers to discover a new responsible and cost-effective way to consume food (Morone, Marcello Falcone, Imbert and Morone, 2018).

- **The Egyptian Chefs Association:** It launched the Sustainable Kitchen program in Cairo for the hospitality and catering business. Sustainable food consumption is becoming more popular. In the hospitality and catering industry, operating your kitchen sustainably will provide you with a competitive advantage. This is especially essential because restaurants and hotels produce a significant quantity of food waste. Food waste can be reduced and profits can be increased by using sustainable food practices (Egyptian Chefs Association, 2019).

The Sustainable Kitchen program, launched in Egypt by Futouris and the Egyptian Chefs Association, has several goals. Firstly, it aims to encourage the use of cooking procedures that preserve nutrient content throughout cooking to enhance the quality of food. Additionally, the program seeks to create and maintain more environmentally friendly meal menus. By reducing food waste, the program also helps to save money and reduce the amount of pollution in the environment. Overall, the Sustainable Kitchen program is a comprehensive initiative that addresses multiple aspects of sustainability in the food industry.

- **We Save Eat:** It is a food waste prevention software that allows users to purchase extra food that collaborating restaurants have not been able to sell during the day at a discount of 50% to 70%. Furthermore, this app attempts to promote food waste awareness among consumers and food retailers (Mullick et al., 2021). The app is available in the Apple Store and Google Play for all mobile devices. Its operation is very simple: consumers can access batches of food available in nearby stores associated with it (restaurants, bakeries, or take-away establishments) via the app installed on their mobile phone and pick them up before closing time at the end of the day, paying conveniently through the mobile device (Martindale & Schiebel, 2017).

- **Copia:** It is a platform that allows restaurants and other hospitality businesses to donate food that they have in excess to nonprofits in the area. All they have to do is to request a pickup for their food and a delivery driver will deliver it to a nearby non-profit organizations. The platform also generates helpful data on food waste and assists with tax deductions, greatly benefiting businesses that give back to the community (Pramana et al., 2021).

- **HACCP Guidelines Program:** People in the restaurant industry are already aware of Hazardous Analysis and Critical Control Points guidelines. so, applying the HACCP program in restaurants is helping to reduce hazards in food production by setting safety standards (Haar & Zeinstra, 2019).

## ***2.3 Fast-Food Restaurants***

Providing food services away from home is essential for tourism. So, the food services industry has become one of the fastest-growing industries, due to many social and business changes around the world. Fast-food chains have spread around the world (Wang, Wang, Xue and Qu, 2016). Such chains are based on some factors that have led to their success such as hygiene, food quality, value, location, and speed of service. In Egypt, there are many fast-food chains; Like Mo'men, Cook Door, McDonald's, Burger King, Hardy, and KFC (Flatters & Willmott, 2009).

Built on that, the researcher has chosen the Fast-food restaurants operation as a target population. Also, fast-food restaurants were chosen as they are typically part of a restaurant chain or franchise operation that provides standardized service. Therefore, any system can easily be applied in a systematic way through all branches.

### ***2.3.1 Definition of Fast-Food***

There are many definitions of this sector. The National Restaurant Association defines the fast-food restaurant as an industry that includes all meals, beverages, and snacks prepared away from home (Xiao, Yang and Iqbal, 2018). Fast food restaurants must be preparing quick meals that take between

10 to 15 minutes. They offer a quick and high quality of service at a lower price. Fast food restaurants help customers to make quick decisions and make the customer more satisfied (Kouzmal, 2009).

### 2.3.2 Restaurant Waste Management

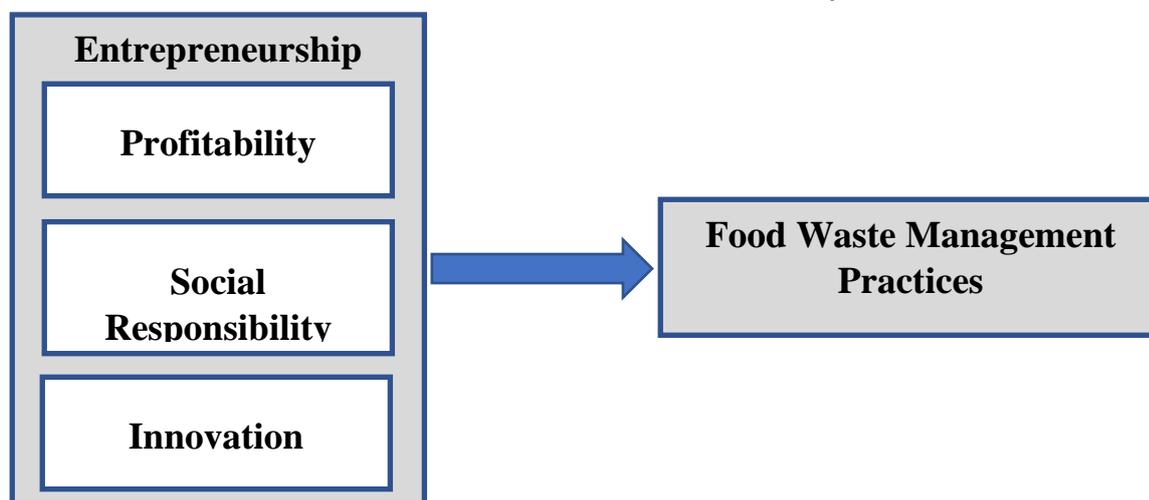
Food waste is a serious environmental problem, particularly in the hospitality sector where it has increased dramatically over the past few years (Principato, Pratesi and Secondi, 2018). Then, organizing successful waste management requires good business sense for your organization that minimizes its capacity and benefits from existing wastes in the best way possible (Aida, 2010).

Also, Food wasted during preparation falls under: overproduction, overstocking, cutting, peeling and overcooking the food (Tuscany, Principato, Pratesi and Secondi, 2018).

## 2.4 Questions of the Study

1. What is the implementation level of food waste management practices in fast-food restaurants in Matrouh Governorate?
2. How is the relationship between entrepreneurship and food waste management practices in fast-food restaurants in Matrouh Governorate?
  - 2.1 How is the statistical relationship between profitability and food waste practices in fast-food restaurants in Matrouh Governorate?
  - 2.2 How is the statistical relationship between social responsibility and food waste practices in fast-food restaurants in Matrouh Governorate?
  - 2.3 How is the statistical relationship between innovation and food waste practices in fast-food restaurants in Matrouh Governorate?

### Variables of the Study



**A Conceptual Model of the Determinants of Food Waste Management.**

## 3. Methodology

### 3.1 population and Data Collection

Matrouh Governorate was chosen as it is one of the most important tourist cities. It's marked by the presence of a large number of tourists and vacationers annually, as well as the large number of tourist villages along the Northern Coast, which are numerous and varied in fast food restaurants. Moreover,

Fast-food restaurants were chosen as they are typically part of a restaurant chain or franchise operation that provides standardized service. Therefore, any system can easily be applied in a systematic way through all branches. In addition, these types of restaurants are the most common in Matrouh Governorate.

The study aimed, in general, to understand the processes and programs of waste management in fast-food restaurants. Also, the study achieved the following sub-goals:

- Providing ideas and solutions to reduce waste in fast-food restaurants through presenting the most important initiatives and solutions to reduce food waste.
- Accessing to the programs used to reduce food waste such as the HACCP guidelines program, Egyptian Chefs Association, “Too Good To Go” and “We Save Eat” applications.
- Explaining the perceptions and actions that are used in food waste management in restaurants through providing and presenting the most important and critical steps that restaurants can use to implement food waste reduction.
- Finding out if the majority of consumers are aware of the environmental impacts of the waste. This can be achieved through increasing the awareness of consumers and staff about food waste reduction by making training programs for staff and making awareness campaigns for consumers and learning about the contributions of entrepreneurship in ideas and approaches to reduce food loss.
- Generating ideas and proposals through entrepreneurship and entrepreneurs and using them in eliminating waste in the restaurant sector.

### ***3.1.1 The Population of the Study***

The total population is used due to the limited scale, and the population is homogeneous. The study consisted of fast-food restaurants in Matrouh Governorate which are 71 restaurants (Ministry of Tourism, Matrouh Governorate 2021). The target population for this study included branch managers from fast food restaurants.

### ***3.1.2 Sample Selection and Size***

Sampling is a systematic process of selecting parts of a population to draw conclusions regarding the population of a study (Filimonau and Delysia, 2019). Moreover, the selection of a suitable sample size is an important feature of any empirical study, in which the goal is to make inferences about a population from a sample. In practice, the sample size used in a study is determined based on the expense of data collection, availability of resources and time, the access to participants and the need to have sufficient statistical power (Wikipedia, 2014). In this study, the sample size was the 142 branch managers as a total population.

### ***3.2 Measures***

To ensure the content validity of the instrument, an invitation to a pilot study of (30) branch managers of fast food restaurants and (5) specialist professors in this sector were asked for a critical evaluation of the questionnaire and clarity of construction. The results of the pilot study showed that two sub-items under the food waste management practices (section one) must be rephrased. Those items were "Food is wasted through the production process" and "Food is wasted through the preparation process", and rephrase these sentences to be " monitoring and controlling the food waste through the production process "and " monitoring and controlling the food waste through the preparation process", in addition to the rearrangement of items under the profitability (section two). The pilot study revealed no difficulty in understanding the questionnaire items.

The researcher designed a self-administered questionnaire as a data collection tool in order to obtain the required data that helped testing the research questions. The questionnaire was divided into two sections for measuring the variables of the study (Table 1). The first section was divided into two

parts: the first part of the survey asked respondents about food waste practices (Chauhan, Dhir, Akram, & Salo. 2021), (Sucheran & Olanrewaju. 2021) and (Makani. 2016), included sub-items to measure branch managers perception, all items were measured using a five-point Likert scale. The second part of survey asked respondents about entrepreneurship (Estephanous. 2015), this part contained three categories: profitability (Makani. 2016), social responsibility (Thirapongphaiboon. 2018), innovation (Aramyan, Grainger, Logatcheva, Piras, Setti, Stewart & Vittuari. 2021) and (Rios, Meier, Gössling & Cornuz. 2018). Each category in turn included sub-items to measure branch managers perception.

Scale ranging from "strongly disagree" (1) to "strongly agree" (5). The survey items are shown in the appendix. The questionnaires were distributed in May, June, July, August, September, and October 2022. This period of time was chosen to ensure the presence of the branch managers, and because this period is characterized by seasonality in fast food restaurants. They were distributed among 142 branch managers, 22 questionnaires were distributed in each fast-food restaurant; only 120 questionnaires were obtained and valid, which represent a response rate of 84%. Hence, the number of valid and returned questionnaires gave a good response rate; according to (Sekaran, 2016), a thirty percent response rate is acceptable for most studies.

## 4. Findings and Discussion

### 4.1 Reliability Analysis

A reliability analysis (Cronbach's Alpha) was conducted to ensure the validity and reliability of the questionnaire items. A reliability test was conducted for food waste management practices and entrepreneurship dimensions (profitability, social responsibility, innovation). All values of Cronbach's alpha for constructs were greater than 0.7 which are considerably high indicating that the reliability of all constructs used in this study had a positive consequence as shown in table 1.

**Table 1: Reliability Statistics of the Study Constructs**

Measure	No. of Items	Cronbach's Alpha
▪ Food Waste Management Practices	21	.810
▪ Entrepreneurship		
 Profitability	10	.750
 Social Responsibility	8	.730
 Innovation	14	.790

### 4.2 Questions Testing

Regression analyses were carried out to test the research questions. Each question may be agreed or not agreed according to the overall significance of the variable in general.

Regression analysis (Table 2) was performed to predict the dimension of entrepreneurship based on food waste management practices. According to the results, Q2 food waste management practices correlate and influence significantly with entrepreneurship ( $R = .425$ ,  $\text{sig}.011$ ). It was noted that about 18% of the variance could be predicted by food waste management practices. Hence, Q2.2 is influence significantly. The results also showed that one dimension of entrepreneurship (Social Responsibility) influenced significantly the food waste management practices. The results showed that ambient conditions caused about 21% of the variance in food waste management practices.

Hence, Q2.1 is not influence significantly. Profitability caused 34% of the variance in food waste management practices. Hence, Q2.3 is not Hence, Q2.1 is not influence significantly.. Innovation caused about 09% of the variance in food waste management practices. The results also showed that one dimension of entrepreneurship (Social Responsibility) influenced significantly the food waste management practices, but profitability and innovation had no significant correlation with food waste management practices. Although entrepreneurship ( $B = .182$ ) had the greatest effect on food waste management practices intentions followed by social responsibility ( $B = .191$ ) and innovation ( $B = .092$ ). However, profitability ( $B = 0.041$ ) had the smallest effect.

**Table 2: Regression Analysis (Entrepreneurship and Food Waste Management Practices)**

		R	R Square	Adjusted R Square	B	Sig.
<b>Entrepreneurship (Q2)</b>		.425 <sup>a</sup>	.181	.156	.182	.011 <sup>b</sup>
<b>1</b>	Profitability (Q2.1)	.186 <sup>a</sup>	.034	.005	.041	.286 <sup>b</sup>
<b>2</b>	Social Responsibility (Q2.2)	.460 <sup>a</sup>	.212	.188	.191	.005
<b>3</b>	Innovation (Q2.3)	.310 <sup>a</sup>	.096	.069	.092	.070 <sup>b</sup>

#### 4.3 Discussion of Results

The study showed that food waste management practices are not widely implemented in fast food restaurants in Matrouh governorate. So, this study aimed to raise the awareness of branch managers about the importance of applying food waste practices in restaurants and how this will be significantly beneficial to them. Moreover, the study showed that there is a relationship between entrepreneurship and food waste management practices through providing ideas and solutions to reduce waste in fast-food restaurants and presenting the most important initiatives and solutions to reduce food waste.

Also, one objective of this study was to investigate the relationship between the three main variables of entrepreneurship (profitability, social responsibility, and innovation) and food waste management practices. Accordingly, the correlations and regression results of this study agreed with only the question of social responsibility (Q2.2) and did not agreed with the other questions about the relationship between profitability, innovation, and food waste management practices (Q2.1 and Q2.3).

The findings revealed that entrepreneurship elements positively affect food waste management practices separately and jointly. These results agreed with Estephanous (2015) who concluded that Entrepreneurship not only increased the world's wealth, but also could solve the world's problems that existed in the past. They also helped in understanding how to use entrepreneurship in solving the city problems, and could help identify new innovative solutions to solve old persistent problems that the government was not able to solve. It could be concluded that entrepreneurship can help in solving environmental degradation problems. Therefore, Egyptian fast-food restaurants can benefit from doing so and solving problems concerned with waste management. Another note to the same effect, the food waste management system needs to be planned and executed in integration between all government entities involved, including different ministries and local government entities like municipalities.

Although, these results agreed with Närvänen, Mattila and Mesiranta (2021) who indicated that the entrepreneurship is an important force behind success in any industry. Apparently, it has been introduced on a large scale in the dynamic and rapidly evolving hospitality, food and beverage, leisure, sport and tourism industries and other industries in the world. Moreover, entrepreneurship is interested in developing new products and services, and ways of delivering these to the customer, and so on. Entrepreneurial activities generally develop newly combined means of production, new

products, new markets, new methods of manufacturing or distribution, new sources of material, or new forms of organization.

Implementation of entrepreneurship in the food and beverage industry especially in reducing food waste in fast food restaurants is very important and effective because it makes the process of reducing food waste more efficient, easy, cost saving by implementing the new idea, new technology, using the developing system to measure the waste. Entrepreneurship then, is key to gaining competitive advantage and, as a result, greater financial rewards. Entrepreneurship and innovation in these industries would therefore seem to be key contributors to economic development.

Also, the findings revealed the relationship between profitability and food waste management practices, showing that profitability doesn't affect food waste management practices from the management side. These results agreed with Goodwin (2018) who indicated that financial investments are frequently necessary to take action for decreasing food loss and waste. Therefore, a scheduled inventory is required to discover where and how much food is being lost or wasted and to choose the appropriate course of action and put it into practice. These expenses may cover paying for personnel, consultants, new machinery, redesigned processes, awareness campaigns, or other initiatives. To sum up, reducing food waste is not only good for the environment and society, but it can also be profitable for businesses. Reducing food waste can bring several benefits to businesses. Firstly, it can lead to significant cost savings by reducing the volume of food that is wasted and thereby decreasing expenditure on food purchases and disposal. Secondly, reducing food waste can increase efficiency in the business, as less time and resources are needed for food handling and disposal. Thirdly, implementing waste reduction strategies can enhance a company's reputation and customer loyalty by demonstrating a commitment to sustainability and responsible business practices. Finally, reducing food waste can also lead to the creation of new revenue streams, such as selling surplus food to employees or customers, or donating it to food banks or other organizations. By taking steps to reduce food waste, businesses can not only improve their bottom line but also contribute to a more sustainable future.

It could be justified that the implementation of food waste management practices does not bring profitability but, on the contrary, requires more money. Moreover, branch managers pointed out that this couldn't be irrelevant to profitability and competitive advantages to the business.

The other variable is social responsibility and it is had a positive consequence on the relationship with food waste management practices. These results agreed with Dou (2016) who found that social responsibility leads to an increase in awareness and has shifted the focus of consumers towards a preference for effective environmental responsibility. Some consumers have shown their willingness to pay more for services that have less environmental impacts. Waste is one of the most environmentally affected factors, for as much to the huge amount of used resources in presenting utilities. It could be justified that the food waste management practice related to social responsibility because it improves the efficiency of the restaurants not only in terms of social and environmental concerns but also in achieving the high-performance goals of the organization. Also, the customer is interested in a restaurant that implements social responsibility by applying the new idea to save the environment and reduce food waste by giving leftovers to the human organizations.

Moreover, the findings revealed the relationship between innovation and food waste management practices, these findings showed that innovation didn't affect food waste management practices. These results agreed with Martin-Rios (2018) who found that the innovation was not effective and significant with food waste management practices. He concluded that there is little interest in innovation as a systematic way to reduce waste and improve waste management.

Also, these results are not agreed with Aramyan and et al (2021) who found that food waste management reduction and innovation are strongly related. Moreover, Improvements in performance, productivity, and competitiveness are the goals of innovations.

It could be justified that innovation and the use of new trends and ways were not implemented in fast food restaurants to reduce food waste, and the manager of restaurants still use the traditional way to reduce this food waste. Moreover, implementing innovation by using a systematic program or applying new trends or applications requires contracting with companies that can provide and help branch managers in fast food restaurants with the innovation system that can be used in training the staff and teaching them how to use innovation in their restaurants .

## **5. Conclusion**

This study examined the food waste management system that needs to be planned and executed in integration between all government entities involved, including different ministries and local government entities like municipalities and ways of finding practical sustainable solutions that can fill the gap between the current policies and reality on the ground, through opportunities for entrepreneurship in the waste sector, by creating a feasible business practice that can empower people to take actions that lead to solving the food waste problems. Also, the manager needs to be fully aware of how entrepreneurship can successfully solve the food waste problem, and overcome challenges in the future. This study is important for entrepreneurs and managers who need to work and invest in the waste sector, and who seek to understand the full picture of how the current system works and how they can fill the gap in reducing food waste. Also, the results showed that the study is important for government entities and non-governmental organizations that wish to promote entrepreneurship in waste management and solve the waste management problem in Matrouh governorate by using entrepreneurship.

Even though the results of the study showed that applying new ideas can solve problems of community needs and value creation for all socioeconomic levels, by creating new and innovative business models, relying on the challenges facing each food and beverage industry and community, solving food waste problems, and creating revenue. Also, the branch managers of fast food restaurants need to know the food waste cycle and market players in two things: the first is to deeper understand the market inefficiencies and challenges in the system of waste management as a process for entrepreneurship to function within, and the second is to identify the gaps for entrepreneurial opportunities along the different stages of the cycle. As the challenges can be business opportunities for entrepreneurship to solve problems and inefficiencies within a new framework that overcomes the shortcomings of the current system.

Entrepreneurship can overcome the current challenges and reach the untapped potential market in the waste sector to solve the main waste problem. The ability of entrepreneurs to function in this sector is dependent on their ability to read and analyze the current system and find the opportunities for growth rather than opposing or fighting other stakeholders. Same for the government that needs to understand and respect openly the needs values of different stakeholders.

## **6. Recommendations and Implications**

The major results after examining the study showed that fast-food restaurants didn't use any new technology or system to reduce food waste. Moreover, applying innovation increases the revenue and profitability of the restaurant operation and reduces food waste. Also, using smart solutions for food waste management is efficient, and cost-effective (mobile app-food waste controlling system). Moreover, the implementation of digital platforms (mobile apps – social media) and effective awareness campaigns can support and solve food waste management. Additionally, different contracts with effective awareness campaigns can affect solving food waste management. Collaborative initiatives can provide a number of benefits (technology- finance solutions – increase awareness) and support food waste reduction.

The study recommended that entrepreneurship opportunities can be created and supported across all the levels of the waste cycle, starting from collection to sorting and recycling of food waste. Besides, for entrepreneurship to succeed in the waste sector, it needs to involve the private sector in any system either on the collection level or the recycling level. Hence, securing stable supplies is crucial to the business.

Additionally, the study showed that the branch managers and owners of fast-food restaurants are not interested in food waste reduction or collection as those processes are costly. Even though, if the managers implement the food waste reduction system, it will bring back for them more benefits and decrease the cost. That is to say, branch managers need to have a separate budget for waste management facilitates and food waste reduction .

To effectively manage food waste, it is essential to have a coordinated effort between various government entities such as different ministries and municipalities. This integration must be planned and executed carefully. Also, opportunities for entrepreneurship can be supported at all stages of the food waste cycle, from collection to recycling. Moreover, collaborative initiatives should be accelerated and supported, and the design, monitoring, evaluation, and knowledge-sharing of food waste prevention should be improved. Additionally, raising awareness among consumers about the importance of preventing food waste and changing social norms around wasting food is crucial. It is also important to monitor and measure food loss and waste quantities to identify and take action on hotspots. By implementing these measures, we can effectively tackle the issue of food waste and promote sustainability.

It has been argued that private sector involvement spearheaded by entrepreneurs could be the answer to the food waste challenges in Matrouh Governorate because entrepreneurs have a better capacity to bring innovation into waste recycling. This research has investigated the influence of entrepreneurship on food waste recycling capacity in Matrouh Governorate. Based on the results, we conclude that fast-food restaurants must implement entrepreneurship to solve the food waste problem because entrepreneurship has a significant impact on food waste recycling.

## **7. Limitations and Direction for Future Research**

### ***7.1 Limitation***

This study focused on the reduction of food waste because it is a current problem in fast-food restaurants and is attracting increasing attention, but this research area has a dearth and needs to be extended. Therefore, the study is interested in the reduction of food waste by using entrepreneurship. Also, the study showed that fast-food restaurants were not interested enough in solving the food waste problem by using new technology, creating new ideas, and systematic programs. So, the study recommended achieving further studies on a larger scale such as different types of hospitality sectors, making comparisons between fast food restaurants and other types of restaurants, or emerging new relationships and other variables. Another limitation could be the timing of achieving the study, that is to say, achieving other studies in different time frames. Finally, the location limitation as the study was achieved in Matrouh Governorate.

Moreover, the outcome of this study provides a contribution to the literature in the area under investigation, especially related to entrepreneurship in the context of improving the food waste recycling capacity. The contribution of this research verifies entrepreneurship as it affects the improvement of food waste recycling capacity. Unexpectedly, the core limitation of this study was the paucity of literature on the involvement of entrepreneurship in food waste recycling in the Matrouh Governorate.

## 7.2 Future Research

Making an expanded study about the traits and characteristics of the entrepreneurship and food waste practices of these restaurants in addition to applying this study again on different hospitality sectors, and on other types of restaurants such as fine dining, or casual restaurants, but this time excluding fast-food restaurants, and another time frame for the reason of coronavirus.

Also, giving an increased interest in applying the advanced systematic program for measuring the amount of food waste and contracting with outsourcing to dispose of the food waste, and show how they affect reducing food waste and achieving revenues.

Moreover, the most important recommendations for branch managers are designing, training, implementing entrepreneurship programs, employment (staff) training, and maintaining them as qualified manpower as possible. Also, studying the food waste costs in detail to try to adjust the costs and prices as possible.

Needless to say, future research is urgently needed on new types of recycling food waste in the fast food restaurants industry. Besides, the research on benchmarking to similar models is not comprehensive. Also, future research is needed about the importance of applying entrepreneurship to overcome the current challenges of food waste reduction, and create new ways and methods to solve this problem.

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